

Serial No.: 10/623,674

Docket No.: GMC0044PA/40320.48/GP-303298

### Remarks

Claims 1-12, 15-18, 20-22, and 24-30 are pending in the application. Claim 7, which was objected to as being an improper dependent claim, has been amended based on the examiner's suggestion. No new matter has been entered.

The examiner rejected independent claim 1 and its dependent claims 2, 3, and 6-9 under 103(a) as being unpatentable over Grasso (US 2001/0004500) in view of Bloomfield (3,982, 962) as evidenced by Mugerwa (*Fuel Cell Systems*). Similarly, the examiner rejected claim 1's dependent claims 4, 5, 10, 11, 12, 15-18, 20, 29, and 30 under 103(a) primarily in view of Grasso and Bloomfield. The examiner rejected independent claim 21, and its dependent claims 22, and 24 - 27 under 103(a) as being unpatentable primarily in view of Eggert (*Characteristics of an Indirect-Methanol Fuel Cell System*) and Okamoto (US 2002/0177016 A1). Similarly, independent claim 28 was rejected under 103(a) based on Eggert and Okamoto, in further view of Bloomfield as evidenced by Mugerwa. The rejections are respectfully traversed in view of the following remarks.

#### ***Claim Rejection under 35 U.S.C. 103(a) based on Grasso/Bloomfield/Mugerwa.***

Independent claim 1 and its dependent claims are nonobvious in light of the teachings of Grasso, Bloomfield and Mugerwa, because these references, singularly or in combination, do not teach all of the claimed limitations recited in claim 1. As stated in MPEP 2143, establishing a prima facie case of obviousness requires certain basic criteria to be satisfied, one of which is that the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The examiner contends that the combination of Grasso, Bloomfield, and Mugerwa teach the recited elements of claim 1. Grasso is cited for teaching a fuel cell power plant containing a

Serial No.: 10/623,674

Docket No.: GMC0044PA/40320.48/GP-303298

reformer operable to generate a gaseous reformat from feed inputs including steam. The examiner asserts that Grasso teaches a HT-PEMFC stack by disclosing a proton exchange membrane (PEM). As the examiner concedes, Grasso does not teach a compressor, an anode exhaust condenser, a cathode exhaust condenser, and a stack excess steam condenser.

To cure the defects of Grasso, the examiner states one of skill in the art would know to modify the teachings of Grasso with the teachings of Bloomfield. Bloomfield is cited as teaching a fuel cell thermal management portion in which water flows to cool the fuel cell, and is partially vaporized in the process (col. 5, lines 28-33). Bloomfield is also cited for teaching air cooled condensers for the anode and cathode exhaust streams, and a compressor adapted to provide compressed air to the fuel cell.

The teachings of Bloomfield and Grasso do not establish a prima facie case of obviousness, because these references fail to teach all elements of claim 1. Grasso and Bloomfield do not teach a PEM stack that operates at high temperatures and generates steam, as recited in our claims. Bloomfield also does not teach that air heated by the condensers may be used to condense a portion of the steam in the stack excess steam condenser. Furthermore, Bloomfield does not teach that the anode and cathode exhaust condensers may heat the air used by the compressor, and does not teach that the air used in the anode, cathode, and stack excess steam condenser may be fed to the compressor. Because the references do not teach these recited claim limitations, a prima facie case of obviousness cannot be established.

The examiner concedes that Bloomfield fails to teach that air may be fed from the condensers to the compressor, but asserts that "one of ordinary skill in the art of plant design and optimization would recognize the potential to recycle the air from the condensers to compressor inlet" based on Mugerwa. Mugerwa states "the greater the degree of interaction possible between

Serial No.: 10/623,674

Docket No.: GMC0044PA/40320.48/GP-303298

the fuel cell and fuel processing subsystems the better the combined performance and system design will be". pg 202.

However, Mugerwa's broad statement provides no teaching or suggestion that would lead one of ordinary skill in the art to modify the teachings of Grasso and Bloomfield by recycling the air from the condensers into the compressor. By asserting Mugerwa teaches this claim element, the examiner is applying an improper "obvious to try" argument in support of the obviousness rejection. *See* MPEP 2145(X)(B) "One cannot base obviousness upon what a person skilled in the art might try or might find obvious but rather must consider what the prior art would have led a person skilled in the art to do." *In re Tomlinson*, 150 USPQ 623 (CCPA 1966). An improper 'obvious to try' rationale is being applied when one skilled in the art would have "to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful". *See* MPEP 2145(X)(B)

In our case, Mugerwa's general assertion provides no guidance on what parameters will improve the design and performance of the plant. Mugerwa does not teach or suggest that recycling condenser air to the compressor inlet will provide the successful result of improved fuel cell plant design and performance. Thus, one of ordinary skill in the art must experiment with numerous plant parameters, without any suggestion or teaching in the references of what plant parameter modifications are likely to be successful in producing improved design and performance. Thus, the examiner is applying an improper obvious to try rationale in support of the obviousness rejection. As a result, this recited claim element is not taught, because the examiner uses an improper obvious to try rationale.

Serial No.: 10/623,674

Docket No.: GMC0044PA/40320.48/GP-303298

Furthermore, even if one skilled in the art by happenstance recycled the condenser air into the Bloomfield compressor, the examiner's hindsight modification would still not teach all of the elements of the claimed invention. As a result, none of the cited references, singularly or in combination, teach or suggest all claim elements recited in claim 1, thus a prima facie case of obviousness has not been established. Accordingly, claim 1 and its dependent claims are in condition for allowance.

***Claim Rejections under 35 U.S.C. 103 based Eggert/Okamoto***

Independent claims 21 and its dependent claims and independent claim 28 are nonobvious primarily in light of the teachings of Eggert and Okamoto, because none of these references, singularly or in combination, teach all of the claimed limitations recited in claims 21 and 28.

Eggert is cited for teaching a primary reactor (reformer) that produces gaseous reformat from a reactant stream comprising steam, wherein the reformat is utilized in a PEM fuel cell stack. The examiner asserts that Eggert teaches a HT-PEMFC because it discloses a PEM fuel stack. The Eggert fuel cell stack contains a thermal management portion wherein the water used to cool the fuel cell stack may also be used for steam reformation in the primary reactor. Eggert is cited for teaching a primary reactor heat exchanger (evaporator) utilized to transfer heat energy from the gaseous reformat to the reactant stream. Eggert is also cited for teaching a catalytic combustor (catalytic burner), and a water gas shift (WGS) reactor and a superheat heat exchanger (superheater) that receives heat from the catalytic combustor and superheats the reactant stream. The examiner concedes that Eggert does not teach the mixing of the superheated reactant stream with compressed air prior to entering the reactor, as recited in independent claims 21 and 28. To cure the noted deficiencies of Eggert, the examiner states that one of ordinary skill

Serial No.: 10/623,674

Docket No.: GMC0044PA/40320.48/GP-303298

in the art would know to modify the Eggert teachings by adding the teachings of Okamoto, because Okamoto teaches supplying compressed air to a primary reactor to promote water vapor reformate reactions and partial oxidation reactions.

However, Okamoto does not teach the mixing of the superheated reactant stream with compressed air prior to entering the reactor, as suggested by the examiner. In fact, the system of Okamoto does not comprise a superheat heat exchanger, and does not discuss superheating at all in the publication. Accordingly, the applicant believes the examiner has used impermissible hindsight as the present specification is the only reference that applicant knows of that teaches mixing compressed air with superheated steam will be successful. When combining references, both the teaching or suggestion and the reasonable expectation of success must be found in the prior art and not based on an applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); *see also* MPEP 2142. Reasonable expectation of success centers on the question of what would the prior art lead one of ordinary skill in the art to do. *In re Tomlinson*, 150 USPQ 623. Eggert does not teach the mixing of a compressed air stream with a superheated stream prior to entering the reformer, and Okamoto is silent on the use of a superheater. One of skill in the art would not know to modify the teachings of Eggert with the teachings of Okamoto, as suggested by the examiner, thus there is no reasonable expectation of success.

Moreover, the applicant respectfully disagrees with the examiner's assertion that the superheated reactant stream must be mixed with compressed air prior to entering the reformer. The prior art does not teach the prior mixing, so there is no support for the examiner's assertion. Moreover, it appears plausible that the compressed air and superheated reactant stream could be mixed upon entering the reactor without prior mixing of the streams. As a result, none of the references teach the limitations of the mixing of compressed air and superheated reactant stream.

Serial No.: 10/623,674

Docket No.: GCMC0044PA/40320.48/GP-303298

as well as the mixing of compressed air and superheated reactant stream prior to the entering the primary reactor, as recited in claims 21 and 28.

Furthermore, the Eggert reference does not teach a HT-PEMFC stack operable to vaporize steam for use in the reactor as recited in claims 21 and 28. The examiner states that Eggert utilizes water for steam reformation (pg 1330); however, there is no teaching that the water has been vaporized in the stack. Eggert does not teach a fuel cell stack that operates above the boiling point of water, and Eggert utilizes a steam generator to vaporize the water leaving the fuel cell stack prior to feeding the steam reformer. Thus, no teaching or suggestion in Eggert would lead one of ordinary skill to interpret "water" as encompassing steam, and there is also no teaching that would lead one to believe that the fuel cell stack of Eggert is capable of generating steam, as recited in claims 21 and 28.

As a result, none of the cited references, either singularly or in combination, teach all recited elements of independent claims 21 and 28, thus prima facie obviousness has not been established. Accordingly, claims 21 and its dependent claims and claim 28 should be in condition for allowance.

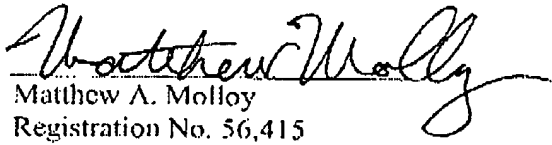
Serial No.: 10/623,674

Docket No.: GMC0044PA/40320.48/GP-303298

The Applicants respectfully submit that, in view of the above amendments and remarks, the application is now in condition for allowance. The Examiner is encouraged to contact the undersigned to resolve efficiently any formal matters or to discuss any aspects of the application or of this response. Otherwise, early notification of allowable subject matter is respectfully requested.

Respectfully submitted,

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